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High-dimensional clustering of compound precipitation and wind extremes over Europe

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Abstract

Disastrous climate events such as floods, wildfires, and heatwaves often occur due to the simultaneous extreme behaviour of several interacting processes. Since in these compound events several spatio-temporal factors are jointly extreme and by their very nature are of high dimension, it is for a proper understanding of them to develop dependence summary measures that are appropriate for extreme value random vectors. These latter is a key ingredient to propose spatial clustering of these temporal processes. Based on the recent development of an algorithm specifically tailored for AI-block models (see Boulin et al., 2023) we propose in this talk a clustering method adapted to compound extreme events. We exemplify this method proposing a regionalization task. More precisely we identify regions based on gridded data from observations and climate model ensembles over Europe. This approach uses daily precipitation sums and daily maximum wind speed data from the ERA5 reanalysis dataset from 1979 to 2022.

Keywords

Spatial clustering, compound extremes, extremal dependence.

References

Boulin, A., Di Bernardino, E., Laloë, T., Toulemonde G. (2023). High-dimensional variable clustering based on sub-asymptotic maxima of a weakly dependent random process. [arXiv:2302.00934](https://arxiv.org/abs/2302.00934).